What is claimed is:

1. A multi-band radio frequency (RF) receiving method in a mobile communication system, comprising:

receiving RF wave signals for four or more non-overlapping bands;

primarily filtering a first wide band including first and second bands adjacent to each other and a second wide band including third and fourth bands adjacent to each other from the received RF wave signals;

low-noise amplifying the RF wave signals of the first and second wide bands, respectively;

secondarily filtering a third wide band including second and third bands adjacent to each other and a fourth wide band including first and fourth bands from the low-noise amplified RF wave signals of the first and second wide bands, and generating two band RF wave signals to be simultaneously received; and

frequency-down converting the two band RF wave signals generated in the secondarily filtering step into two band intermediate frequency (IF) wave signals by means of first and second oscillation frequencies.

2. The method as claimed in claim 1, wherein the first oscillation frequency is the intermediate frequency of the first and second bands, and the second oscillation frequency is the intermediate frequency of the third and fourth bands.

3. A multi-band RF receiving apparatus in a mobile communication system, comprising:

an antenna portion for receiving RF wave signals for four or more non-overlapping bands;

a first filtering portion for filtering a first wide band including first and second bands adjacent to each other and a second wide band including third and fourth bands adjacent to each other from the RF wave signals received from the antenna portion;

an amplifying portion for low-noise amplifying first and second wide band RF wave signals supplied from the first filtering portion, respectively;

a second filtering portion for filtering a third wide band including second and third bands adjacent to each other and a fourth wide band including first and fourth bands from the first and second wide band RF wave signals received from the amplifying portion;

a path setting portion disposed between the amplifying portion and the second filtering portion, and setting a path between the output port of the amplifying portion and the input port of the second filtering portion according to two bands selected to be simultaneously received among the first through fourth bands; and

a frequency-down converting portion for converting the two band RF wave signals generated in the second filtering portion into two band IF wave signals by means of first and second oscillation frequencies.

4. The apparatus as claimed in claim 3, further comprising a mode signal generator for generating first through fourth mode signals according to the two bands selected to be simultaneously received among the first through fourth bands.

5. The apparatus as claimed in claim 3, wherein the first oscillation frequency is the intermediate frequency of the first and second bands, and the second oscillation frequency is the intermediate frequency of the third and fourth bands.

6. The apparatus as claimed in claim 3, wherein the first filtering portion includes a first bandpass filter for filtering the RF wave signals received in the antenna portion, and generating the first wide band having the first and second bands adjacent to each other, and a second bandpass filter for filtering the RF wave signals received in the antenna portion, and generating the second wide band having the third and fourth bands adjacent to each other.

7. The apparatus as claimed in claim 6, wherein the amplifying portion includes a first low-noise amplifier for amplifying the output of the first bandpass filter, and a second low-noise amplifier for amplifying the output of the second bandpass filter.

8. The apparatus as claimed in claim 3, wherein the second filtering portion includes a third bandpass filter for filtering the RF wave signals provided from the path setting portion and generating the third wide band having the second and third bands, and a bandstop filter for filtering the RF wave signals provided from the path setting portion and generating the fourth wide band having the first and fourth bands.

9. The apparatus as claimed in claim 8, wherein the path setting portion includes a first switch for switching the RF wave signal of the first wide band output from the first bandpass filter and outputting the same to one of the third bandpass filter and the bandstop filter, and a second switch for switching the RF wave signal of the second wide band output from the second bandpass filter and outputing the same to one of the third bandpass filter and the bandstop filter.

10. The apparatus as claimed in claim 9, wherein the frequency down-converting portion comprises:

an oscillating portion including a first oscillator for generating a first oscillation frequency and a second oscillator for generating a second oscillation frequency;

a mixing portion including first through fourth mixers for obtaining differences between outputs of the third bandpass filter and the bandstop filter and outputs of the first and second oscillators; and

a third filtering portion including fifth through eighth bandpass filters for filtering the outputs of the first through fourth mixers and generating IF wave signals of the first through fourth bands.

11. The apparatus as claimed in claim 10, wherein the first oscillation frequency is the intermediate frequency of the first and second bands, and the second oscillation frequency is the intermediate frequency of the third and fourth bands.

12. The apparatus as claimed in claim 3, wherein the first through fourth bands are bands for a Global Positioning System (GPS), Distributed Control System (DCS), Wideband-Code Division Multiple Access (W-CDMA) and Industrial, Scientific and Medical (ISM) 2400 for wireless LAN, respectively.

13. The apparatus as claimed in claim 3, wherein the first through fourth bands are bands for Personal Digital Cellular (PDC) 1500, DCS, W-CDMA and ISM2400, respectively.

14. The apparatus as claimed in claim 3, wherein the first through fourth bands are bands for PDC1500, Personal Communications Systems (PCS), W-CDMA and ISM2400, respectively.

15. The apparatus as claimed in claim 3, wherein the first through fourth bands are bands for PDC1500, Digital Enhanced Cordless Telecommunications (DECT), W-CDMA and ISM2400, respectively.